Restricted

NAVY DEPARTMENT

BUMED NEWS LETTER

a digest of timely information

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Prodromal Signs of Shock (NRC Shock Report #7): In the absence of simple, definite prodromal signs of shock, it is well to assume that shock is impending and to institute treatment whenever the seriousness of the injury suggests that there has been extensive blood loss or reduced circulating blood volume; for example, blood-soaked clothing, bleeding wounds of some duration, signs of internal hemorrhage, burns of large surface area, extensive crushed areas, severe dehydration, or a history of prolonged exposure to cold air or of immersion in cold water. Troops under prolonged attack, depleted by loss of sleep, inadequate

food, dehydration, chilling or excessive heat, and physically and emotionally exhausted, will develop shock more readily than usual in response to injury.

The following manifestations frequently appear with the progressive development of shock and should be watched for, but treatment should not be delayed until they appear:

1. Abnormal external appearance. In developing shock the extremities and the skin are generally cold and often clammy. Frequently the skin is pallid or ashen; it may be cyanotic, livid, with delayed filling of vessels after they have been blanched.

2. Symptoms. These are variable. Thirst is almost invariably present; apprehension or restlessness may be present. At times a patient in shock or approaching shock may be deceivingly calm, quiet, rational, free from pain. Nausea and vomiting may occur.

3. Falling arterial pressure, when present, is an index of progressing shock. It should be recognized, however, that it is not invariably present; it may not be present in the early stage of shock, or the pressure may be actually temporarily elevated.

4. Character of the pulse. The pulse usually decreases in volume and becomes thready in quality. A rising pulse rate is a useful indication of developing shock, but shock may exist, even in marked degree, with pulse rates of 80 or less per minute.

Present Status of the Shock Problem: The establishment of a close correspondence of circulatory changes in shock in animal experiments and in man has given confidence in the application to human cases of results obtained in work on lower mammals, especially dogs. This statement is based on a comparison of studies of cardiac output (direct Fick principle), plasma volume, plasma proteins, red cell volume, blood gases, oxygen intake, carbon dioxide production, blood electrolytes, renal function and renal blood flow, and systemic arterial pressures in unanesthetized patients and dogs.

Reduction in circulating blood volume is the most important factor in the initiation of shock. There is agreement on two points: (a) that this reduction is due to loss of blood or fluid at the site of injury, whether mechanical or thermal, and (b) that, with the possible exception of very late stages of shock, there is no notable increase in "capillary permeability" in non-traumatized regions of the body. From (a) it follows that replacement of circulating volume is the primary consideration in therapy.

The most reliable criteria of the circulatory disturbance which underlies shock are cardiac output and blood volume. As shock progresses the cardiac

output continues to decrease, even when there is no further reduction in circulating blood volume. The level of arterial pressure is not a reliable criterion of the degree of circulatory impairment in early shock nor does the hematocrit, considered alone, indicate the relative degree of loss of whole blood or plasma.

After a critical point has been reached in a diminishing blood volume, a progressive tissue anoxia leads to metabolic changes and to damage to certain organs such as the brain, and perhaps the heart and the liver, that constitute the state termed "irreversible shock." These consequences of an inadequate circulation emphasize the very great importance of adequate early treatment. (Shock Report #7, National Research Council)

The vasoconstriction characteristic of the early stage of shock acts to produce a serious reduction of renal blood flow, and it has been demonstrated by Van Slyke and others that permanent damage to the kidney is done if the state of shock is allowed to exist for more than a relatively short period. (See Bumed News Letter, June 23, '44.)

Stead and others have shown, by making simultaneous measurements of the intra-auricular pressure and the cardiac output in normal individuals subjected to experimental hemorrhage (350 c.c. to 800 c.c.), that some reduction in right auricular pressure can take place without decrease in the cardiac output and without significant fall in arterial blood pressure. These investigators believe that the intra-auricular pressure is normally higher than is necessary to maintain cardiac output and that it can fall somewhat in the normal person with relative safety. Further blood loss results in lowered cardiac output, but the mechanism of vasoconstriction comes into play and, in spite of considerable reduction in blood volume, circulatory failure may not result, the normal blood pressure may be maintained and the clinical signs of shock may be absent. The injured person who has been inadequately resuscitated may be in a comparable situation. Such an individual may have had sufficient replacement therapy (blood, plasma, saline) to restore, with the aid of these compensatory mechanisms, apparently normal circulatory dynamics but insufficient to return his blood volume to normal and to "stabilize" him.

Churchill, in a recent paper (Medical Bulletin, NATOUSA, June '44.), has emphasized the importance of recognizing this state in battle casualties. Such a patient may not be able to tolerate without the development of circulatory failure any procedure which may place increased demands on his circulation.

"The observation has been made repeatedly that even when blood pressure and pulse rate have been restored to normal or nearly normal levels, movement of the patient by litter to the operating tent or the minor disturbance incident to a roentgen-ray examination may precipitate a drop in blood pressure

and a rise in pulse rate. Anesthesia and operation in such a patient may result in relapse into a state of profound shock or terminate in death."

In discussing the types of additional demands to which the shocked patient may be subjected, Churchill mentions the following:

"(a) Mechanical - particularly with reference to movement of the injured part.
(b) Postural - involving gravity redistribution of the reduced circulating blood volume.
(c) Hemodynamic - including further reduction of blood volume by hemorrhage.
(d) Muscular activity - that increases oxygen requirements."

To quote further from Churchill's paper:

"Particular attention should be devoted to the ability of the organism to withstand conditions that increase the consumption of oxygen. In experiments or observations designed to test the relative merits of blood derivatives and whole blood this dynamic concept should be held foremost. The definition of shock should be extended to include the inability of the organism to meet demands that are commonly within the normal physiologic range, rather than limited to a descriptive index of abnormal findings. Only when a shocked patient has become "stabilized" by effective resuscitative measures to the point where these demands can be met is the shock adequately corrected."

Evaluation of the degree of impending shock or the adequacy of resuscitation is of great importance, as in most instances the aim of resuscitation therapy is the preparation of the patient for transportation and operation. The most valuable diagnostic procedures - estimation of the blood volume and of the cardiac output - are not feasible in hospitals in combat areas. Much useful information can be gained by estimating the hemoglobin, plasma protein and blood specific gravity by the copper sulfate (See Bumed News Letter, Vol. 1, No. 9 - Phillips et al.) and other methods and from the hematocrit. The simplicity of the copper sulfate method makes it valuable in places where tests requiring more complicated apparatus cannot be carried out.

Two simple clinical tests are available and may be helpful: (1) In a patient in impending shock a marked fall in arterial blood pressure will often follow a change from the supine position to an erect or semi-erect one (Duncan et al. - Ann. Surg., July '44.) and (2) the application of tourniquets to the thighs at a pressure just below the diastolic blood pressure will result in a fall of pressure in the brachial arteries. The maneuver serves temporarily to trap the blood in the venous channels of the extremity. The normal individual or "stabilized" patient shows no significant drop in blood pressure following this tourniquet maneuver. (Blalock, OEMcmr 6.)

However, chief reliance must be placed upon clinical judgment and an appreciation by the surgeon of the risks involved in subjecting an inadequately "stabilized" patient to procedures which further burden his already heavily taxed compensatory mechanisms.

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Penicillin in Infections of the Urinary Tract: The sulfonamides are usually ineffective in infections of the urinary tract caused by the Streptococcus faecalis.

Helmholz and Sung have recently studied the (in vitro) bactericidal action of penicillin in urine against this and certain other micro-organisms. The following table shows the concentration of penicillin in urine at which certain bacteria are killed:

Bacteria	Oxford Units of Penicillin per c.c. of Urine
Staphylococcus aureus	0.05
Streptococcus faecalis	3.0
Proteus ammoniae	8.0
Escherichia coli	30 to 60+
Aerobacter aerogens	60.0+

The authors conclude that its bactericidal action in urine against Streptococcus faecalis and Proteus ammoniae at these low levels suggests that penicillin may have therapeutic possibilities for these two types of infection. (Proc. Staff Meet. Mayo Clin., July 12, '44.)

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While clinical trials of penicillin in infections caused by the Streptococcus faecalis and Proteus ammoniae should be made, it must be remembered that in most infections involving the walls of hollow viscera the concentration of the chemotherapeutic agent in the tissues surrounding the lumen is more important than its concentration in the fluid contained in the lumen. This is true of the urinary and gastrointestinal tracts.

Some recent experiments of Miller et al. have provided valuable confirmation of this knowledge. While studying the action of penicillin on gonococcal urethritis, they found that within two or three hours after the initiation of treatment and before the course of the infection was completed, the urethral exudate underwent a striking change in character and quantity. It became paler, less viscous in consistency and much reduced in quantity. By the fifth or sixth hour it had practically disappeared.

They then carried out experiments to determine whether the therapeutic effect resulted from the penicillin brought to the tissues by the blood stream (systemic effect) or from the local gonococcocidal action of the penicillin excreted in the urine and passed over the urethral mucosa during each micturition.

In two cases penicillin instilled locally into the urethra at intervals of two hours and retained five minutes was ineffective in clearing up a gonococcal urethritis which subsequently responded to penicillin administered by the intramuscular route.

The reciprocal experiment was then made. Seven patients with gonococcal urethritis were dehydrated previous to starting treatment with penicillin and were then instructed not to void during the course of intramuscular injections. In every case the urethral exudate underwent the same changes in character and disappeared as rapidly as in the cases where the bladder was emptied at intervals during the treatment. The smears and cultures became negative at the same rate. (J.A.M.A., July 1, '44.)

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In Vitro Action of Penicillin on Treponema Pallidum: Dunning et al., using a technic devised by Eagle, have demonstrated that penicillin in relatively high concentrations is effective against the treponema pallidum in vitro.

During certain studies with penicillin on the prophylaxis of syphilitic skin infections in rabbits, it was demonstrated that a strain recovered from an insufficiently treated rabbit (in which infection developed in spite of prophylaxis with penicillin) was more resistant in vitro to the action of penicillin than had been the original strain. These observations suggest that in the treatment of human syphilis, it may be well to administer a sufficient quantity of penicillin to cure the patient rapidly; otherwise, there will be the possibility of producing a penicillin-resistant strain. (Proc. Soc. Exper. Biol. & Med., Mar. '44.)

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Penicillin Therapy: A comprehensive article on penicillin appears in Medical Bulletin No. 21 of the Office of the Chief Surgeon, European Theater of Operations. It was designed for the instruction of medical officers of the Army in the administration of penicillin to battle casualties in France. The following passages are quoted from this paper because of their general interest to medical officers in combat areas:

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a. It is anticipated that the supply of penicillin available in this theater will be sufficient to allow for its widespread use in the treatment of all battle wounds.

b. "Penicillin treated" will be entered on the EMT or Field Medical Record, after the diagnosis, in every case which is so treated. Additional data, including dosage in units, method of administration (parenteral or local) and time and date of administration will be entered on the back of the EMT or in the Clinical Record form in cases where a Field Medical Record has been initiated.

c. Only by the conscientious addition of the words "Penicillin treated" to the diagnosis list will it be possible to separate these cases. This will permit the collection and study of a large group of cases, in which this drug has been used to determine its efficiency in the treatment of battle casualties.

Therapy:

a. Commanding officers will be responsible for selecting patients for penicillin therapy.

b. Conditions for which penicillin may be given:

(1) Septicemia due to staphylococcus, and (2) meningitis, empyema thoracis, bacterial endocarditis, and osteomyelitis.

(3) Infections of serious nature which have failed to respond to sulfonamide therapy and which are due to organisms in the penicillin-sensitive group.

(4) Less serious infections in personnel the importance of whose duties makes it desirable that they return to duty in the shortest time possible.

(5) Superficial wound infections due to organisms in the penicillin-sensitive group in which wound revision, secondary closure or skin grafting is contemplated.

(6) Gas gangrene.

(7) Battle casualties and non-battle injuries.

(8) Sulfonamide-resistant gonorrhea.

Laboratory Tests for Patients Receiving Penicillin Therapy:

Test for Sensitivity: The determination of sensitivity of an organism to penicillin may be done by the trench-plate technic. A blood agar plate is used. A trench 1 cm. wide is removed from the middle of the plate. This is then filled with a mixture of agar and penicillin, containing 1 unit of penicillin per c.c. of the mixture. (Precaution: Cool agar to below 50°C. before adding the penicillin.) The plate is then streaked across with the standard strain and with the organism to be tested. Inhibition of the standard strain averages about 8

to 10 mm. Very insensitive strains occasionally grow across the penicillin-filled trench. Freshly prepared plates must be used for each test, otherwise the penicillin diffuses throughout the plate.

Test for Bacteriostatic Power, Patient's Serum: Some means of attempting to determine whether or not the patient is receiving enough penicillin may be desirable. This is done by testing for a bacteriostatic level in the serum. A sample of blood is removed and the serum separated, using sterile technic. Four test tubes are set up containing the following: (a) undiluted serum; (b) serum diluted 1:2 with broth; (c) serum diluted 1:4 with broth; (d) broth without serum (control). If facilities permit, more accurate estimations of the amount of penicillin in the blood serum can be obtained by making dilutions up to 1:32 or 1:64. Each tube is now inoculated with a loopful of a diluted (1:1,000 or 1:10,000) 12-hour broth culture of either the patient's organism or the Florey staphylococcus. After 12 hours' incubation the result may be determined either by inspection, or subculture on agar plate. The latter is more desirable. If the serum is bacteriostatic, the first tube should show no growth; frequently inhibition is noted in the second and third tubes as well. Repeating this procedure on samples drawn at hourly intervals between two successive doses gives an indication as to whether the patient is receiving enough penicillin to produce bacteriostasis in the first place, and secondly, whether the bacteriostasis persists through the interval between doses. (M. Bull. #21, Office of Chief Surgeon, E.T.O., July '44.)

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Phosgene from Freon: In an item on Malaria Control which appeared in the Bumed News Letter of April 16, 1943, the following statement was made in describing the characteristics of Pyrethrum-Freon Insecticide: "It is non-inflammable; in fact, it is a fire extinguisher." This is quite true. However, in the presence of flame or of very hot surfaces (about 550°C.) freon (CCl_2F_2) may be partially decomposed with the formation of volatile acids, phosgene ($COCl_2$) and chlorine.

In view of the possibility that small amounts of phosgene or chlorine may be formed under such conditions, it would surely be wise not to use the Pyrethrum-Freon Insecticide as a fire extinguisher in enclosed spaces. (Ref.: The Comparative Life, Fire and Explosion Hazards of Common Refrigerants - National Board of Fire Underwriters, 1933.) (J.R.H.)

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Smallpox Vaccination: Twenty-three cases of smallpox with five deaths have occurred among military personnel in China-Burma-India and seven cases with one death in the Persian Gulf Command between January 1 and May 1, 1944. The reported faults are the use of vaccine close to or past the expiration date,

improper refrigeration of vaccine, and faulty technic such as the use of strong antiseptics to clean the arms. All of the severe cases and several mild ones occurred in persons who had never been successfully vaccinated or in those whose scar was due to vaccination in childhood. In every case the immunization register showed the entry "immune" under reaction, often of recent date. These really represented complete failure of the vaccination to take. The patients usually stated that the vaccination was not inspected or was inspected five to seven days after vaccination.

Apparently some medical officers assume that an immune reaction occurred in all cases not having vaccinia or vaccinoid reaction. Accordingly, entries of "immune reaction" have been made on immunization registers as a result of an inspection made a week or more after vaccination. The immune reaction is characterized by the development of a papule and a small area of redness, usually within the first twenty-four hours after vaccination. The peak of the reaction is passed within three days, although a small brownish-red area may persist for a week. The inspection of arms a week or more after vaccination will differentiate vaccinia and vaccinoid reactions but will not differentiate immune reactions from failures to take. Inspection two to three days after vaccination is necessary for such differentiation. Entries of immune reaction on immunization registers should not be made unless the reaction actually has been observed about two to three days following vaccination. Failure of any reaction to develop usually indicates either poor technic of vaccination or the use of vaccine virus which has lost its potency. Revaccination of individuals not known to be immune reactors should be done as often as is necessary. (Bull. U. S. Army M. Dept., Aug. '44.)

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The Common Skin Diseases (IV): Psoriasis:

Etiology. The cause of psoriasis is unknown.

Clinical Features: Psoriasis is a chronic recurrent eruption. The typical lesions are rounded, reddish and dry. They are covered by somewhat adherent white scales. These scales may be quite thick and "piled up." Light scraping of the surface of a lesion will produce an abundance of silvery white, mica-like scales. If the scales are completely and carefully removed, the exposed surface of the lesion will exhibit pin-point bleeding (Auspitz sign). This sign is important in differential diagnosis and should be looked for.

The areas most frequently involved are the elbows, knees, scalp and lower part of the back. However, any portion of the skin surface may be involved.

On the elbows and knees the lesions tend to be coin-sized or larger solid plaques.

On the trunk and lower part of the back: Large confluent plaques are seen which frequently spread peripherally and tend to clear in the center. In rapidly spreading psoriasis, the involvement may be in the form of small pin-head to pea-sized discrete widely scattered lesions ("guttate" psoriasis).

On the scalp: The lesions are usually discrete and rounded. They should be looked for along the anterior hair line. Often they will extend onto the forehead. Removal of the scales may reveal pin-point bleeding. Occasionally only the scalp is involved, in which case the chronic scaling may be mistaken for dandruff.

In chronic cases the nails may show multiple small depressions (pitting).

Occasionally an acute exacerbation is accompanied by arthritis of both large and small joints. Those most frequently affected are the small joints of the hands.

If the characteristic dry, scaly appearance, the typical distribution (look at the knees, elbows and scalp first), and the pin-point bleeding sign are kept in mind, little difficulty in diagnosis will be encountered in the ordinary case. A history of long duration with partial or complete clearing during the summer months will aid in establishing the diagnosis.

Treatment: There is no "cure" for psoriasis. The most that can ordinarily be accomplished is temporary clearing of the lesions.

Internal medication: Many drugs have been advocated from time to time. None is invariably effective.

External medication: An imposing list of currently-used preparations could be compiled. This would serve only to produce confusion. If the eruption is spreading rapidly, it is best to apply a mild, soothing preparation such as plain Lassar's paste:

Zinc oxide	25.0
Starch	25.0
Petrolatum	50.0

This is applied twice daily. Once daily the skin is cleansed with mineral oil.

For the usual chronic case, Goeckerman's plan of treatment is advocated. This entails the daily use of the following ointment:

Crude coal tar	6.0
Lanolin to mix	
Zinc oxide	30.0
Petrolatum qs	120.0

The ointment is applied heavily to all affected areas. Once daily it is partially removed, leaving a light brownish film on the skin. The involved areas are then exposed to ultraviolet irradiation, the length of daily irradiation being gradually increased to the degree required to produce tanning.

Ammoniated mercury ointment (5 to 10 per cent) with the addition of 2 per cent salicylic acid is another simple and useful local application. The following preparation is often effective on scalp lesions:

Ammoniated mercury	6.0
Salicylic acid	1.0
Lanolin	
Petrolatum aa qs ad	60.0

(Apply to scalp lesions each night, rubbing in well. Cover scalp with a towel or stocking cap. Shampoo out each morning.)

X-ray therapy will often produce prompt involution of psoriatic lesions. However, many distressing cases of radiodermatitis have followed the repeated use of this agent. Its routine use is not recommended, and it should never be employed in the acute stage of the eruption. (J.M.S.)

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"Research on Malaria Conducted in the Cairns Area of Australia, by the Director of Medicine: Twelve months ago a large scale research unit was formed in the Cairns Area (17° S. latitude) in an endeavor to obtain accurate knowledge regarding the control of malaria by various antimalarial drugs in volunteers exposed to heavy and repeated malaria infection. Some 250 volunteers, being all 'clean skins', have during this period been the subject of a most exhaustive and thorough experiment, unique in the history of malarial investigation.

"Anophelene mosquito larvae from New Guinea have been flown regularly to Cairns where they are bred out into adults. The female mosquitoes are then heavily infected by feeding on specially selected carriers known to harbour sexual malignant tertian or benign tertian parasites in the blood. Subsequently, volunteers who are taking antimalarial drugs are repeatedly bitten by these heavily malaria-infected mosquitoes. The results of this research show conclusively if troops have taken the correct dosage of atabrine that:

a. Malignant tertian malaria will be suppressed and finally cured by the concentration of atabrine in the blood.

b. Benign tertian malaria will be 100 per cent suppressed in all cases where the soldier can absorb atabrine. The proportion of individuals who cannot absorb atabrine is negligible.

c. Malaria carriers will not be found in the Force since the atabrine concentration prevents sexual parasites appearing in the blood.

d. The death rate will be practically nil, and no blackwater fever will develop.

"These results are not adversely affected by such factors as:

a. Exertion.
b. Heat.
c. Cold (-9°C.).
d. Emotions like anger or fear.
e. Diet.
f. Blood loss.
g. Anoxia as in high altitude flying (15,000 to 18,000 ft. at 28°F.).
h. Any other demonstrable factor.

"Every effort has been made to subject these volunteers to conditions which would bring on attacks of malarial fever, but 'break-throughs' have not resulted. The problem appears to be purely a chemical one. Provided the necessary concentration of atabrine is built up and maintained in the blood and internal organs, during the period of exposure to infection and for one month thereafter, the individual is protected against malaria to the extent set out above.

"The suppressive dosage prescribed is one tablet of atabrine every day for one month before entering a malarious area. If troops have not been taking suppressive atabrine, they should be given two tablets daily for seven days before embarkation and thereafter one tablet every day. If a man misses a day, he should take two tablets next day; if he misses two days, he should take three tablets so as to maintain a satisfactory atabrine concentration in the body.

"In jungle fighting in malarious areas the position may be summed up by saying: 'Take atabrine regularly in the correct dosage and there will be little or no malaria. Fail to take atabrine regularly and heavy malaria casualties will be inevitable.'

"Some three to four weeks after such troops stop taking atabrine, however, attacks of benign tertian malaria will develop. The proportion of such malaria casualties will accurately reflect the extent to which personal protection, the use of mosquito repellent, the destruction of adult mosquitoes and the control of larval breeding have been practiced, and will depend on the general standard of antimalarial discipline in the Force.

"Result of Conference on Sickness Wastage: It was appreciated before the conference that there was some hostility on the part of experienced commanders of field formations in relation to the conclusions of the Director of Medicine's large scale malarial research; nevertheless, the conference achieved the following:

a. Complete and absolute acceptance by all commanders that the results of Brigadier Fairley's work at Cairns proved beyond all doubt that our malarial wastage in New Guinea could have been avoided if such results had been available twelve months ago.

b. Malarial wastage in the field, providing atabrine is available, is entirely a matter of lack of training and/or lack of discipline.

c. It is necessary to effect a vast improvement in general hygiene training and in particular our atabrine training. It is essential that a drill for the administration of atabrine be introduced and rigid adherence to it strictly policed.

d. Before troops not on routine suppressive atabrine dosage are moved to a malarious theatre, they should be placed on suppressive atabrine - two tablets daily for at least seven days before disembarkation.

e. It is urgently necessary to convey the conclusions of the Cairns research to all ranks, and to achieve their absolute acceptance of them. This is mainly a matter of salesmanship and correct organization and presentation of the data in a form which will be accepted by the soldier. This objective, it is believed, will be achieved only by the constant attention of regimental officers aided by a general continuous propaganda by way of films, pamphlets, lectures, etc."
(LHQ Liaison Letter B14.)

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From the South Pacific combat areas comes certain evidence which, although largely supporting the conclusions from the Cairns experiment, still differs in several important respects. The South Pacific workers in the field report a significant number of cases of malignant malaria "breaking through" in individuals on suppressive atabrine therapy with atabrine serum levels well above those usually attained on one tablet a day. They find further a difference in the atabrine levels of break-through of primary and secondary attacks, both of falciparum and vivax malaria. It was calculated that with 0.10 Gm. of atabrine per day, faithfully taken, protection could be expected in but 81 per cent of individuals contracting primary infections of P. falciparum. Similar dosage, however, would protect 90 per cent of the cases of primary vivax malaria and suppress almost 100 per cent of vivax relapses. In regard to primary falciparum malaria, it was indicated that even doubling the generally recommended weekly dosage, namely, giving 1.5 Gm. per week, still would fail to protect in about 5 per cent of cases.

It is evident from these findings, in contrast to the inference to be drawn from the Cairns investigations, that a significant number of break-throughs are not chargeable to failure to take the drug regularly. Even in the best disciplined units, cases of malaria, especially the malignant type, may still be expected.

However, it must be clearly borne in mind, as all workers in the field agree, that the great proportion of break-throughs which occur are essentially a result of poor atabrine discipline.

Another very important point brought out by the South Pacific field workers is that increasing the suppressive dosage of atabrine when numerous breakthroughs are occurring may not necessarily improve the situation. A study made on a group in which atabrine was increased from one tablet to two tablets per day indicated, from the curve of serum levels, that those individuals who had taken the drug regularly before showed higher serum levels, as might be expected, but those previously with low levels still maintained low levels despite the increase in dosage. One obvious explanation is that those who fail to take the smaller doses of the drug regularly will tend to fail, as well, to take the increased dosage.

This emphasizes the prime importance of supervising the administration of suppressive treatment. When malaria is disabling a unit, one should first perfect atabrine discipline and then, if necessary, resort to increased dosage. (J.J.S.)

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The Effect of Smoking Cigarettes: Roth et al. studied the effects of smoking standard cigarettes and also those made of corn silk on four men physicians and two women technicians. The subjects were between the ages of 22 and 41 years, were in good health and were habitual smokers. As the subjects were accustomed to the psychrometric room where the procedures were carried out, psychic stimulation was at a minimum.

Following the smoking of two standard cigarettes, or French ashless cigarette paper with standard tobacco, or standard cigarettes in a British filter holder, the following changes were observed: (1) a decrease in the cutaneous temperatures of the extremities, (2) an increase in the basal metabolic rate, and (3) changes in the electrocardiogram consisting of an increase of heart rate and a lowering of the amplitude of the T waves.

These changes followed also the intravenous injection of 2 mg. of nicotine. They did not follow the smoking of two corn-silk cigarettes. The changes in the cutaneous temperatures of the extremities following smoking two standard cigarettes was the same whether the individual was supine or whether he was sitting or engaged in slow walking.

The authors believe that the habit of giving an injured man a cigarette is not advisable if arterial injury has occurred, as segmental spasm of the artery is common in such trauma, and the resulting vasoconstriction may be significantly intensified in a person sensitive to tobacco by the vasospastic action of nicotine. (J.A.M.A., July 15, '44.)

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Smithwich is quoted by Roth and his co-workers as reporting "a decrease of blood flow through the finger after a deep breath, immersion of the contralateral hand in cold water, a loud noise or even an unpleasant thought." The inability to obtain a cigarette under conditions of physical and psychic stress certainly will produce "unpleasant thoughts" in the habitual smoker. However, it should be borne in mind that where the blood supply of a limb is compromised following injury to an artery, the arterial spasm which results may be aggravated by the injudicious use of tobacco.

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Effect of Cosmic Rays on Aviators at Extremely High Altitudes: An inquiry was made by the Bureau regarding possible deleterious effects of cosmic rays on aviators at extreme altitudes. The following reply was received from Dr. Louis Flexner of the National Research Council to whom the inquiry was sent:

"I have consulted with Dr. Thomas Johnson, physicist attached to the Ballistics Laboratory at Aberdeen Proving Grounds, as well as with Mr. Dean Cowie of the Department of Terrestrial Magnetism of the Carnegie Institute of Washington, and what I have to report to you results entirely from the advice which I received from them.

"I am informed that the intensity of cosmic radiation at altitudes from 60,000 to 70,000 feet varies between 300 and 1,000 ions per cubic centimeter per second, the variation in part being a function of latitude with the lowest intensities at the equator. An intensity of 1,000 ions per c.c. per second is equivalent to 0.04 roentgen units per day. Since the tolerance to radiation is widely accepted to be 0.1 roentgen unit per day, you will see that it follows that there is no need to worry about exposure to the maximum intensities known to occur between 60,000 and 70,000 feet. The intensity at 40,000 feet is approximately half that at 70,000 feet."

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Examination for Appointment in the Dental Corps, Regular Navy: To give the large number of reserve officers an opportunity to enter the regular service, a competitive examination for appointment in the Dental Corps, U.S.Navy, will be given October 16, 1944, at the Naval Training Station, Norfolk, Virginia; the Naval Training Center, Great Lakes, Illinois; the Naval Training Center, San Diego, California; the Naval Dental School, National Naval Medical Center, Bethesda, Maryland; and the Naval Training and Distribution Center, Treasure Island, California.

Applicants must have been under thirty-two years of age upon first reporting for active duty in the Navy. A circular of information may be obtained from the Bureau of Medicine and Surgery upon request. (R.S.D.)

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SUGGESTED THERAPY FOR THE MORE COMMON FRACTURES AND DISLOCATIONS

	SITE	REDUCTION	IMMOBILIZATION TYPE	TIME	PRECAUTIONS
FRACTURES OF THE HAND AND WRIST	Lower end of radius, including Colles	Immediate; preferably under general anesthesia.	Plaster splints or bivalved cast in position of volar flexion and ulnar deviation except in reversed Colles which should be in extension.	4 to 6 weeks	X-ray all sprained wrists in at least three positions (anterior-posterior, lateral and oblique) to rule out a scaphoid fracture. If there is prominence on the volar surface, x-ray it to rule out semilunar dislocations. X-ray a Colles fracture after reduction; never be satisfied until the joint lines are restored to normal. Do not extend the anterior splint for a Colles fracture beyond the proximal crease of the palm; insist on immediate and frequent active motion of the fingers and shoulder after immobilization. Apply skeletal traction immediately for an oblique, over-riding, fracture of a metacarpal or phalanx. Do not allow flexion of a finger after a "baseball finger" injury for six weeks.
	Scaphoid of wrist	None	Plaster cast from elbow to knuckles and proximal crease of palm, incorporating thumb to terminal phalanx; thumb in extreme abduction, wrist in about 30 degrees dorsi-flexion and 20 degrees of radial deviation.	12 weeks or longer	
	Semilunar dislocation	Immediate; by hyperextension with force against the dislocated bone as the wrist is flexed, or by straight traction on hand.	Anterior splint or plaster cast.	3 to 4 weeks	
	Metacarpals	By traction which may be skeletal.	Roll of bandage or palmar ball splint, preferably with anterior board, plaster or moulded splint.	3 to 4 weeks	
	Phalanges	By traction which may be skeletal.	Anterior plaster, board, or metal splints. "Baseball finger" in hyperextension; proximal phalanx in flexion; middle and terminal phalanges in extension.	3 weeks	
FRACTURES OF THE UPPER ARM, ELBOW AND FOREARM	Shaft of the humerus	Immediate; by traction and manipulation.	"Hanging" plaster cast from axilla to knuckles and proximal crease of palm.	6 to 8 weeks	Volkmann's ischemic contracture of the forearm and hand, the most serious of all fractures, can often be avoided by promptly and immediately relieving all constriction and pressure over blood vessels at the elbow; surgery may be necessary. After reducing a fractured elbow and immobilizing in acute flexion, observe the circulation and sensation in the hand and fingers hourly for the first 24 hours. Record all neurological and circulatory disturbances in fractures and dislocations of the upper extremity. Do not apply a circular plaster cast to an elbow or forearm fracture without bivalving or splitting and spreading the plaster to allow for swelling. For fracture of the humerus, the patient should be kept in an erect or semi-reclining position for 10 days to 2 weeks after reduction and application of a "hanging" cast.
	Supracondylar, condylar or "T" fracture of the humerus	Immediate; in presence of little to moderate swelling; in presence of marked swelling gentle manipulation for alignment only.	Posterior plaster splint or bivalved cast from shoulder to knuckles with elbow in flexion.	3 to 4 weeks	
	Olecranon of ulna	Open operation in all fractures with separation of fragments.	Posterior plaster splint or bivalved cast with elbow in full extension.	4 to 8 weeks	
	Head of radius	Not satisfactory; operative removal if displaced or comminuted.	Posterior plaster splint or bivalved cast with elbow at right angle or partly flexed; in undisplaced fractures use sling only and start early motion.	3 weeks	
	Upper third of ulna with anterior dislocation of head of radius.	Immediate; open plating of ulna and closed reduction of dislocation.	Posterior plaster splint or bivalved cast with elbow in flexed position.	4 weeks	
	Shafts of radius and/or ulna	Immediate; closed manipulation; if unsuccessful, consider plating of fractures or skeletal traction through lower end of radius and ulna with counter skeletal traction through olecranon.	Anterior and posterior plaster splints or bivalved cast from knuckles and proximal crease of palm to axilla.	4 to 6 weeks	
	Posterior dislocation of elbow	Immediate; under general anesthesia.	Posterior plaster splint or bivalved cast followed by active motion.	10 days	
FRACTURES AND DISLOCATIONS OF THE SHOULDER GIRDLE	Clavicle	Immediate; by manipulation and abduction of the shoulders.	T splint with arm sling. Adjust splint daily to maintain abduction of shoulders. Figure-of-eight dressing is sometimes satisfactory.	4 to 6 weeks	Do not allow full motion for 6 weeks after primary anterior dislocation of the shoulder. In a fracture of the shaft of the clavicle keep both shoulders well abducted and the affected extremity supported until the union is complete. Maintain complete reduction of an acromioclavicular dislocation by adequate dressings for at least 6 weeks.
	Scapula	None except in marked displacement when traction on the upper arm may be necessary.	Velpeau dressing until pain has subsided, followed by a sling for the arm of the affected side.	3 to 4 weeks	
	Dislocation of shoulder	Immediate; by traction, arm in position, with gentle internal and external rotation; if unsuccessful, Kocher maneuver. Analgesia or general anesthesia.	Shoulder cap of adhesive and sling or Velpeau dressing.	6 weeks for primary; 3 weeks for recurrent.	
	Head and neck of humerus	Immediate; by traction and manipulation.	"Hanging" cast with early circumduction exercises.	3 to 4 weeks	
FRACTURES OF THE HIP, THIGH AND KNEE	Hip	Nail fracture after manipulation and reduction, under general anesthesia.	Advisable to apply bivalved plaster cast or traction immediately after reduction and nailing.	16 to 24 weeks	Do not move a thigh or hip injury with possible fracture until the lower extremity has been immobilized in a Thomas splint with traction. In a fractured femur, treat pain with morphine, shock with blood plasma and intravenous fluids. Always take x-rays of the hip in the anterior-posterior and lateral planes. Do not allow distraction of the fragments of a fractured femur.
	Shaft of the femur	Skeletal traction within first 24 hours sufficient to maintain reduction.	Thomas splint with traction, followed by plaster spica or walking brace.	16 to 24 weeks	
	Patella	Open operation if fragments are separated.	Posterior plaster splint or bivalved cast.	3 to 6 weeks	
	Condyles of tibia	If displaced, by open operation.	Posterior plaster splint or bivalved cast.	8 to 12 weeks	

(Shands, Air Surg. Bull., July '44.)

SUGGESTED THERAPY FOR THE MORE COMMON FRACTURES AND DISLOCATIONS (Cont.)

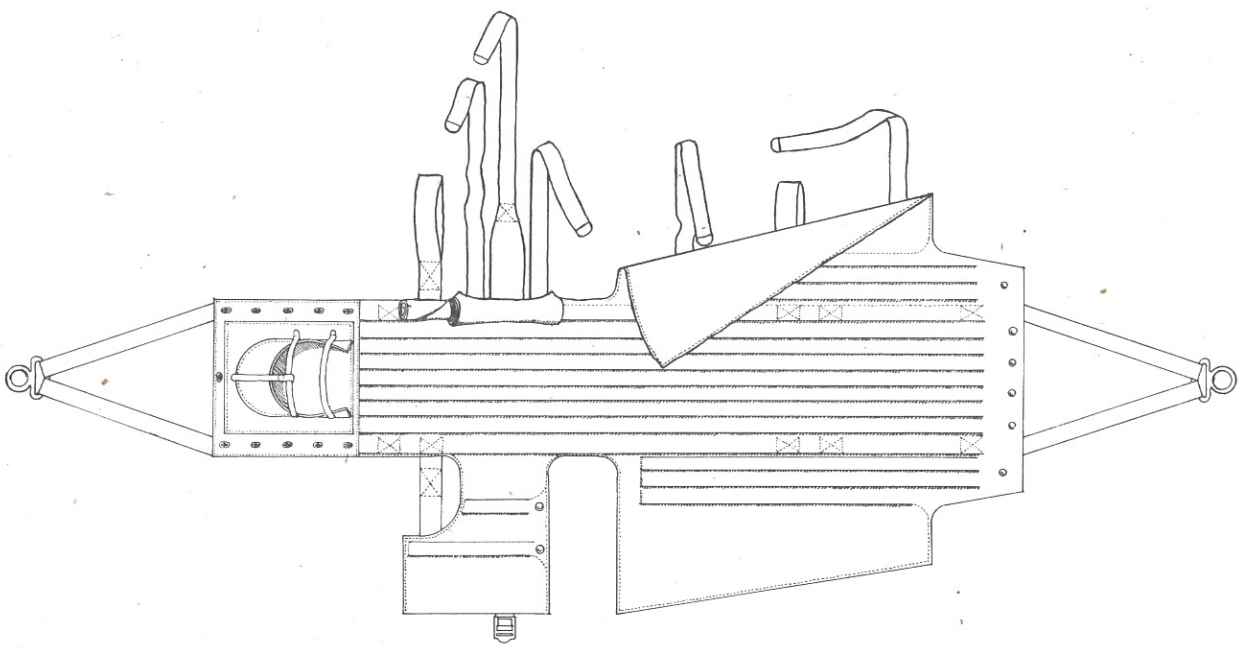
	SITE	REDUCTION	IMMOBILIZATION TYPE	TIME	PRECAUTIONS
FRACTURES OF THE LEG AND ANKLE	Tibia and/or fibula shafts	Immediate; with traction and manipulation or open reduction and fixation of fragments by pin or plate	Simple fracture: plaster cast from upper thigh to toes. Complicated fracture: skeletal traction with pin through os calcis or open reduction with internal fixation of fragments.	8 to 14 weeks	In a fracture dislocation of the ankle, restore the joint mortice so that the long axis of the tibia bisects at right angles the top of the astragalus. An oblique fracture of the tibia with a fracture of the fibula will not maintain correct position without traction or internal fixation. Immobilize a Potts fracture in inversion with plaster. X-ray a fracture dislocation of the ankle after reduction to be certain that there has been no change in position or recurrence of deformity.
	Fracture dislocation of the ankle	Immediate; restoring the ankle mortice, under general anesthesia.	Plaster splint or cast; foot inverted for a Potts fracture, and in neutral position for others.	6 to 8 weeks	
	Fracture of external malleolus	None	Walking plaster from knee to toes.	3 to 5 weeks	
FRACTURES OF THE FOOT AND TOES	Os calcis	Immediate; break up impaction and restore tuber angle; skeletal traction with lateral compression in severely comminuted fractures.	Plaster cast from toes to knee. Incorporate skeletal traction pins when used with foot in plantar flexion.	12 to 16 weeks	Watch circulation in all badly comminuted and displaced fractures and dislocations. Do not allow too early weight-bearing in a fracture of the os calcis. Adequately support the longitudinal and metatarsal arches when weight-bearing with a shoe is allowed.
	Astragalus (Fracture dislocation)	Open operation usually necessary.	Plaster with foot in slight plantar flexion.	12 to 16 weeks	
	Metatarsals	Manipulation and skeletal traction through phalanges.	Skeletal traction and plaster from toes to knee.	4 to 6 weeks	
	Phalanges	Usually necessary only in big toe, with traction through terminal phalanx.	Plaster splint or cast.	3 to 4 weeks	
FRACTURES OF THE SPINE AND PELVIS	Cervical spine	(a) Without neurological changes: traction with Sayre type head halter, using approximately 6 lbs. weight, neck in hyperextension; (b) with neurological changes: skeletal traction with Crutchfield tongs.	After traction, Calot or Minerva type plaster jacket; may be followed by cervical spine brace.	16 to 24 weeks	Do not move an injured dorsal or lumbar spine except in the prone position. Move an injured cervical spine only in the supine position with a support under the neck to maintain hyperextension. Record the presence or absence of damage to bladder and urethra in fracture of the pelvis. Hyperextension of the upper dorsal spine will not reduce a compressed fracture of the body of a vertebra. Do not perform a laminectomy for a spinal injury with cord damage unless there is x-ray evidence of a fragment of bone within the spinal canal or of progressive neurological changes. The back support for a fracture of the body of the lower dorsal or lumbar vertebra should not be removed in less than 12 weeks. Do not immobilize the spine for a simple fracture of a transverse or spinous process. Do not allow weight-bearing in a complete fracture through the pelvis for 12 weeks.
	Lower dorsal and lumbar spine - compressed fracture of body of vertebra	(a) Without neurological changes: in hyperextension under anesthesia with pressure over the deformity to reduce prominence; (b) with neurological changes: gradual hyperextension on special fracture bed or frame.	Plaster body cast in hyperextended position from neck to pubis.	12 to 24 weeks.	
	Pelvis	(a) If complete and displaced upward: traction to lower extremity of affected side; (b) with dislocation of hip: center skeletal traction downward on the lower extremity and lateral skeletal traction through the greater trachanters.	Broad pelvic hammock suspension followed by double spica.	12 to 18 weeks	
COMPOUND FRACTURES--GENERAL	All	Immediate; as indicated by specific fractures.	In padded plaster cast after (1) thorough irrigation and debridement of wound; (2) frosting of wound surfaces with sulfanilamide crystals; (3) lightly applying vaseline gauze into wound and (4) applying dry dressings over wound.	As indicated for specific fracture	Do not scrub or shave surrounding skin without protecting the wound. Avoid washing foreign bodies into wound by superficial irrigation. Make incisions longitudinal and large enough to perform a complete debridement. Excise all damaged muscle tissue, but save skin. Apply internal fixation at time of debridement if need for immobilization. Do not remove attached or large detached bone fragments. Pack wound loosely and do not suture. Do not be satisfied with less than complete immobilization.

(Shands, Air Surg. Bull., July '44.)

Semi-Rigid Litter, Canvas, NMRI Model A, S6-691, Added to Supply Table: It was recently announced that the semi-rigid litter developed at the Naval Medical Research Institute had been added to the Supply Catalog. In the development of this litter an attempt was made, to incorporate into one litter the various suggestions and recommendations made to the Bureau of Medicine and Surgery by medical officers afloat, for a litter to transport casualties from engine rooms, holds and other compartments where access hatches were too small or space too cramped to permit the use of Stokes or Army stretchers.

After a careful study of the plans submitted, an examination of available types and models, and a review of the literature dealing with semi-rigid litters, it was concluded that the greatest advantage could be obtained by simplifying the design of Neil Robertson's type litter for mass production and to meet more effectively the requirements of lightness, flexibility, floatability (unloaded), strength, compactness, durability, comfort and protection to the casualty.

The present litter meets these requirements. To date it has proved valuable to the Air Forces in removing casualties from B-17 bombers. The litter has been designated "Model A" in the hope that suggestions for improvements will be submitted by medical officers and result in new and better models. Comments should be sent to the Bureau of Medicine and Surgery. (D.R.M.)



Motion Pictures as Training Aids: Training is a never-ending function of the Medical Department, co-equal in importance with the actual care of patients. All enlisted and officer personnel must be trained in personal hygiene, sex hygiene and first aid. All Hospital Corps personnel must be trained in nursing technics. Laboratory and dental technicians require special training. Medical and dental officers must continually refresh and renew their knowledge of professional subjects, of sanitation and preventive medicine, and of special topics of military importance.

Motion pictures and Slide Films are invaluable aids in this training program. BuMed has already made available, through production and procurement, over one hundred medical films on a wide variety of subjects. These films are available on a loan basis from the nearest Training Aids Library or Central Aviation Film Library. Arrangements may be made to have new films routed to your activity by request directed to the officer in charge of the nearest film library.

Some of these films should be seen by all medical officers, and might with benefit be shown at staff conferences. Other films should be seen by special groups. When you have a teaching assignment, why not find out what training aids are available and use them? (J.S.B.)

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Supplemental List of Medical Films: The following films not previously listed (see Bumed News Letter of March 3, 1944) are now available:

MN-1511 Care of Sick and Injured by Hospital Corpsmen.

(a) Many Men at Many Guns - Black & White, Sound, 20 mins. This dramatic indoctrination and morale film shows the young hospital corpsman what training he gets, his duties ashore and afloat and the important role the hospital corpsman plays in the Navy. It should be seen by all Hospital Corps personnel.

(k) Preoperative Care - Black & White, Sound, 11 mins. The preparation of a patient for operation - both mentally and physically - is depicted.

(s) Surgical Dressings - Black & White, Sound, 19 mins. Demonstrates the technic for assisting a doctor in doing dressings and removing sutures, the technic for handling sterile supplies, and the care and set-up of a good dressing cart.

(v) Giving an Enema - Black & White, Sound, 20 mins.
Discusses the two main types of enemas, retention and evacuant, and demonstrates the procedure for giving them and the aftercare of the patient and equipment.

SN-2778 Clasp Partial Denture Design - Black and White, Sound, 75 frames.
The various types and the underlying mechanical principles of clasp partial denture is shown and described in detail. Of interest to all Dental Officers and technicians.

MN-1965 Clinical Malaria - Black & White, Sound, 28 mins.
This film is of interest to all medical officers. It is a basic teaching film on the clinical aspects of malaria. By a combination of actual photography and animation, the relationship of the life cycle of the malarial parasite in the blood stream to the patient's clinical symptoms is clearly shown. The symptoms, signs and pathological body changes associated with the three common types of infection are depicted.

MN-105a Deep Sea Diving - Medical and Physical - Color, Sound, 28 mins.
This film explains in non-technical language the physiology of deep sea diving. Compression and decompression are explained in detail.

MN-3432 Emergency Care Air Crew Casualties, Parts I & II - Black & White, Sound, 55 mins.
Injuries to members of an air crew engaged in a high altitude combat mission require special first-aid technic. This film shows how such emergencies may be handled while the plane is in flight.

MC-2209 Hypodermic Syringes & Needles, Their Care and Function - Color, Sound, 28 mins.
Shows how glass hypo syringes are made and how they should be cared for. The methods of giving intradermal, subcutaneous, intramuscular, and intravenous injections are demonstrated and further explained by animated drawings.

MA-3790 Louse-Borne Diseases - Black & White, Sound, 18 mins.
This is a non-technical film which points out the importance and dangers of louse infestation. Means of prevention and methods of delousing are demonstrated. It is useful in instruction of all personnel concerning louse-borne diseases and their prevention.

MA-4106 Meet McGonegal - Black & White, Sound, 11 mins.
This film shows how a man who has suffered a loss of both hands by amputation has been enabled to carry on a normal life through the use of hook-type prostheses. The film should be seen by all amputation cases. All medical officers and hospital corpsmen will also find it interesting and informative.

MN-2454a One a Minute - Black & White, Sound, 14 mins.
This is a dramatic short film designed primarily for the male audience. It points out in theatrical terms that almost all prostitutes and easy women have venereal disease. It should not be shown as a training film but should be placed on the entertainment program. Consult the District V.D. officer about this one.

MA-4195 Pick-Up - Black & White, Sound, 36 mins. (RESTRICTED).
This dramatic film, for male personnel only, shows how a soldier contracts gonorrhea from a "pick-up". The film should be seen by all male enlisted personnel as part of their sex hygiene training.

MN-2153b Specific Gravity of Healthy Men - Black & White, Sound, 13 mins.
This film depicts a method of ascertaining the specific gravity of healthy men by means of Archimedes Principle and further relates specific gravity to obesity and body fitness.

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Addendum to Handbook of the Hospital Corps, U. S. Navy: An Addendum to the 1939 edition of the Handbook of the Hospital Corps is being included in the present reprinting of that production.

This Addendum is included in the July issue of the Hospital Corps Quarterly, and is also printed as a paper-covered pamphlet, copies of which may be obtained on requisition. The pamphlet also is for sale by the Superintendent of Documents, Government Printing Office, Washington, D. C., at 20 cents a copy.

The Addendum contains new information regarding the treatment and care of the sick and injured as well as other information considered of particular value to users of the Handbook of the Hospital Corps.,U. S. Navy. (N.L.S.)

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Restricted TB MED 45

WAR DEPARTMENT TECHNICAL BULLETIN

NOTES ON CERTAIN INFECTIOUS DISEASES

War Department, Washington 25, D. C. . . . . 20 May 1944

1. ANTHRAX (MALIGNANT PUSTULE, WOOLSORTERS' DISEASE). a. Agent. Bacillus Anthracis.

b. Incubation period. 1 to 5 days, depending upon dose, route of entry, and resistance of host.

c. Routes of infection. See d below.

d. Onset and course. (1) Cutaneous form. Infection occurs by implantation on injured skin surfaces (through small scratches, cuts, abrasions, other wounds, or burns), or by contamination of pre-existing skin infections. Following the incubation period, the first sign of infection is a red macule, or a spreading red margin around the wound. This may be painless, or be described as "itching," "tingling," or "pricking." Within 24 hours after appearance of the macule, a crop of small pink vesicles appears on the surface of the reddened area; a black hemorrhagic fleck appears in the center, and the central vesicles break down, leaving a shallow ulcer which discharges a serosanguineous fluid. The surrounding zone of pink vesicles becomes hemorrhagic, and with drying is transformed into a hard, black eschar. The eschar is deeply imbedded, and may remain in position for as long as 8 weeks, depending upon its size. Concurrently with the initial appearance of vesicles, edema appears in adjacent soft tissues, and may spread extremely rapidly, sometimes causing considerable distortion within a few hours. The local lesion is seldom painful; regional lymph nodes, however, may become enlarged and tender, and may remain palpable for many weeks. General symptoms,such as malaise, joint pains and fever

of moderate degree, commonly accompany the early stages of the lesion, and subside with satisfactory treatment.

(2) Intestinal form. Onset is characterized by insidious development of malaise; the first definitive symptom is that of generalized abdominal pain. In the course of 24 to 72 hours, the pain becomes extremely severe and there is frequently vomiting of blood-stained material; less commonly there is diarrhea with blood-stained stools. Abdominal distension is marked, and there may be muscular rigidity characteristic of generalized peritonitis. Collapse occurs suddenly in from 1 to 5 days after onset, and leads to death in nearly 100 per cent of untreated cases.

(3) Pulmonary form. This type of infection follows inhalation of infective doses of organisms or their spores. After the incubation period, the initial symptoms are of malaise, pain in the chest, and slight cough. Following onset, the progress is usually rapid; dyspnea, marked cyanosis of face and mucous surfaces, and paroxysms of coughing with production of moderate quantities of thin, frothy red sputum are common. Physical examination may reveal nothing, but usually shows fine, moist rales throughout the chest; occasionally dullness to percussion is noted at both lung bases. Temperature is seldom extremely high and may even be subnormal. Collapse and death occur within 3 to 5 days after onset in nearly 100 per cent of untreated cases.

e. Clinical diagnosis. (1) Cutaneous form. The appearance of a macular lesion, covered or surrounded by vesicles or even large blebs, becoming hemorrhagic and attended by marked regional edema, variable adenopathy, fever, and leukocytosis of 15,000 to 20,000 is suggestive of this infection.

(2) Intestinal form. Malaise, followed by generalized abdominal pain and rigidity and vomiting of blood-flecked material, suggest this form of infection. Ruptured appendix, perforated peptic ulcer, and acute pancreatitis have been confused with intestinal anthrax infection and surgery has been reported on such cases.

(3) Pulmonary form. Malaise, pain in the chest, dyspnea, severe cyanosis, and generalized fine, moist rales are suggestive of this form of infection. Diagnosis of broncho-pneumonia or even lobar pneumonia is sometimes made in these patients. Differentiation may be impossible except by examination of sputum. X-rays may show no changes whatever.

f. Laboratory diagnosis. (1) Cutaneous form. Exudate from the lesion should be smeared, stained, and examined as promptly as possible. The appearance of many organisms of typical morphology in such exudates constitutes a presumptive diagnosis of anthrax. Complete identification of the organisms can be made only by animal inoculation.

(2) Intestinal form. Blood-flecked vomitus should be smeared, stained, and examined by microscope. The finding of significant numbers of typical organisms is presumptive evidence. Confirmation of diagnosis requires culture and animal inoculation. Aspiration of abdominal fluid may reveal organisms.

(3) Pulmonary form. Sputum should be examined microscopically and cultured as promptly as possible. Throat swabs may be smeared and cultured, or be washed and the washings injected into animals. Lung punctures may reveal organisms.

(4) In any form, blood cultures in plain broth medium should be repeated at frequent intervals. Positive blood cultures usually indicate a grave prognosis and usually occur late in the disease.

g. Treatment. (1) Any local lesion should be dressed carefully and the dressings may be soaked with diluted (1,000 units per c.c.) penicillin; local lesions are otherwise to be left strictly alone and the part immobilized. Treatment with parenteral penicillin should be instituted immediately as soon as a presumptive diagnosis is made, without waiting for confirmation by animal inoculation. 20,000 to 30,000 units of the drug should be given intravenously and the same dose intramuscularly; thereafter the same dose should be repeated intramuscularly every 3 hours until the following criteria are satisfied: edema has begun to recede; temperature has returned to normal; and there is no evidence of fresh vesicles or other sign of activity of the infection.

(2) Sulfadiazine is effective and may be given at the rate of 4 grams initially and followed by 1 gram every 4 hours, each dose accompanied by 15 grains sodium bicarbonate. If penicillin is available, sulfadiazine is probably not needed; in the absence of penicillin, sulfadiazine alone is indicated.

(3) Antiserum is less effective than penicillin or sulfadiazine and is not recommended.

2. BOTULISM. a. Agent. Toxins of Clostridium botulinum.

b. Routes of entry. Intoxication may follow ingestion of contaminated food, inhalation of contaminated dust, implantation upon mucous surfaces, cuts, scratches, abrasions, burns, or other wounds.

c. Incubation period. Variable from a few hours to several days, depending upon the dose, the route of introduction, and the resistance of the individual. By the usual route, the alimentary tract, the incubation period is usually 1 to 4 days.

d. Onset and course. If the toxin has been ingested, the first evidence is likely to be burning sensations in the abdomen, followed by nausea and vomiting. If the toxin has been introduced through other routes, no digestive disturbance is seen. Following inhalation or introduction through wounds, the first symptoms are likely to be malaise, headache or dizziness, followed shortly by double vision, blepharoptosis, and sometimes photophobia. Difficulty in speech or swallowing is common. Weakness, followed by paralysis of muscles of the neck and later of the extremities usually ensues. Fatal cases terminate, in untreated individuals, in from 3 to 6 days after onset as a result of respiratory paralysis. Introduction of the toxins through wounds may cause paralysis of muscle groups to occur in the region of the wound before general or remote paralysis is apparent.

e. Clinical diagnosis. Botulism is suspected in a person who shows paralysis (usually of the extra-ocular muscles and the muscles of speech and swallowing) after ingestion of suspected food or water, or following implantation on skin injuries or burns.

f. Laboratory diagnosis. Laboratory studies of the patient are of little value except after recovery, when neutralizing antibodies may be present in the serum. Examination should be limited to study of materials suspected of containing toxin; such material is injected subcutaneously into mice; presence of the toxin is indicated by flaccidity of abdominal muscles (belly-drop when suspended by the tail), respiratory paralysis, and death within 1 to 3 days. The antigenic type of the toxin should be determined by injection into several mice, each of which has been protected by a specific antitoxic type.

g. Treatment. Following ingestion, prompt removal of stomach contents and purgation are indicated; later on, these measures are not only useless, but harmful. The patient should be kept quietly at rest and a large fluid intake maintained. With the onset of respiratory paralysis, a respirator or manual artificial respiration should be persistently used. Type-specific antiserum may be effective before paralysis occurs, but is useless thereafter; it is available only in very limited quantity.

3. BRUCELLOSIS (UNDULANT FEVER, MALTA FEVER, MEDITERRANEAN FEVER).

a. Agent. Brucella melitensis and related species.

b. Routes of infection. The digestive tract and the conjunctiva may be portals of entry. Infection may be produced also through the respiratory tract and through contact with the skin.

c. Incubation period. Usually about 2 weeks; varies from 10 to 60 days.

d. Onset. Brucellosis is a disease of variable severity, ranging from a mild, hardly recognizable form (with neurosthenia only) to a virulent, rapidly fatal infection; may be sudden or insidious, accompanied by varying degrees of lassitude, weakness, headache, chills, anorexia, constipation, and vague bodily pains.

e. Symptoms. Brucellosis is characterized by the wide range of the manifestations of infection. Attacks may be fulminating and rapidly fatal, or may be brief or relapsing and chronic. In the first week of acute severe attacks the picture frequently resembles typhoid fever. Frequently the symptoms are mild in the presence of high fever and in chronic cases symptoms are many and severe, with slight fever.

f. Duration. Variable, usually about 3 months, some lasting for years. Mortality is from 2 to 6 per cent.

g. Diagnosis. Clinical diagnosis is difficult and requires confirmation by blood culture. Brucellosis may also resemble influenza, tuberculosis, malaria, pyogenic septicemia, subacute bacterial endocarditis, acute rheumatic fever, tularemia, appendicitis, and cholecystitis. The diagnosis is proved by blood culture.

h. Treatment. No efficacious, specific agent is available to combat brucellosis.

4. COCCIDIOIDOMYCOSIS (COCCIDIOIDAL GRANULOMA). a. Agent. Coccidioides immitis.

b. Routes of infection. Most infections occur through inhalation of dust laden with organisms. Skin abrasions may also be involved. Exposure of large numbers of people to the agent may result in many cases of generalized disease with acute involvement of lungs in addition to many cases of benign or latent infections. No man-to-man transmission is on record.

c. Incubation period. One case reported to be 7 days (laboratory infection). Majority of cases around 1 to 3 weeks.

d. Onset. Simulates influenza or broncho-pneumonia. Pulmonary involvement may occur without much fever.

e. Signs and symptoms. Unpredictable. Systemic infection may terminate fatally in a few weeks, but chronic infection may remain localized for years. Primary lesion may occur on skin, but usually lungs are involved first due to inhalation infection occurring as predominant route. Thoracic pain occurs in majority of cases early. Erythema nodosum develops 8 to 15 days after onset, disappearing spontaneously in 4 to 5 days. Cutaneous lesions of dissemination may ulcerate or heal. Pus in active lesions is thick, yellow-green, and ropy, containing sporulating forms of fungi. If dissemination occurs, bones and joints are vulnerable, with ankle, wrist, and elbow joints involved in that order of frequency. Fistulae may form and loss of weight, night sweats, and fever (to 104°F.) may be manifested.

f. Duration and prognosis. Recovery from acute infection usually occurs in 3 to 6 weeks. Mortality rate is less than 0.1 per cent. The prognosis is variable. Very few cases show evidences of blood stream dissemination; those which do show higher mortality rates (50 to 60 per cent).

g. Diagnosis. Scattered circular shadows in X-ray of lungs are highly characteristic. Microscopic identification of organism in sputum or pus. Exposure of large numbers of people to the agent may result in many cases of generalized disease with acute involvement of lungs in addition to many cases of benign or latent infections.

h. Treatment. Disease shows periods of spontaneous remission. Rest and symptomatic conservative treatment. No specific chemotherapy known.

5. EQUINE ENCEPHALOMYELITIS. a. Agents. Clinically related diseases, but immunologically distinct viruses (American (Eastern and Western), Venezuelan, etc.).

b. Routes of infection. The mosquito is the natural vector. Man can possibly be infected by all routes.

c. Incubation period. Thirty-six to 48 hours to 10 days or more, depending on strain.

d. Onset and symptoms. Acute onset. Severity of disease varies with dose. Clinical manifestations are based on the development of focal central nervous system lesions. Therefore, symptom variation is great depending on the site of involvement. Meningeal irritation and nuchal rigidity are almost always present. Convulsions or coma, vomiting and headaches are common. Limb paralysis or paresis may occur. Fever ranges from 102° to 105°F. Residual brain damage is common.

e. Duration and prognosis. Variable with the virus. Following acute prostration for 2 to 4 days, the American disease may terminate in death in approximately 25 per cent of the cases. The Venezuelan strain is most infectious for man, but has a lower mortality (about 11 per cent).

f. Clinical diagnosis. Clinical diagnosis is made tentatively on the basis of central nervous system involvement of numbers of patients in suspected areas. Actual proof of the disease is based on the laboratory diagnosis.

g. Laboratory diagnosis. There is a polymorphonuclear leucocytosis. Virus circulates in blood of patient during early days of disease and may be isolated by inoculating the blood or serum intracerebrally or intranasally into mice or guinea pigs. Injection of animals known to be immune to various strains of equine encephalomyelitis establishes not only the specificity of disease, but also of strain. After 5 days patients have neutralizing antibodies in the blood. Complement fixing antibodies may also be demonstrated. Brain tissue from post mortem material may be used for isolating the virus. Cerebrospinal fluid is under increased pressure and has a hazy appearance. Cell counts vary from 200 to 2,000 per cm. Polys or round cells may be present. Total protein is high; sugar content not significant.

h. Treatment. There is no specific treatment.

6. GLANDERS (FARCY). a. Agent. Pfeifferella mallei (Bacillus mallei).

b. Routes of infection. Usually skin or nasal and oral mucous membranes. Unusual portals: conjunctiva, alimentary tract, and the respiratory tract.

c. Incubation period. Several hours to several weeks; usually 1 to 4 days.

d. Onset. Usually acute with fever and other systemic symptoms; may be insidious.

e. Symptoms and signs. General malaise with anorexia, chills, fever to 104°F., generalized pains, vomiting and diarrhea. A nodule forms at point of entry of organism, which later breaks down, leaving an ulcer or sinus. Other cutaneous and subcutaneous nodules and abscesses subsequently behave similarly. There is often a papular or pustular skin rash. The disease spreads through lymphatic and vascular systems to form nodular lesions in numerous viscera including lungs. The disease may be acute or chronic, the former resembling a septicopyemia.

f. Duration and prognosis. Acute glanders is usually fatal, and in 8 to 15 days. Chronic glanders has a mortality of about 75 per cent. The course of the chronic disease is from several months to several years.

g. Clinical diagnosis. This depends upon an evaluation of the signs and symptoms in conjunction with the laboratory findings.

h. Laboratory diagnosis. Identification of specific organisms; the positive agglutinations are significant if titre of serum exceeds 1:800. The sputum of patients should be studied by culture and guinea pig inoculation (intraperitoneal--Straus reaction).

i. Treatment. Strict isolation technique and symptomatic. No data on sulfonamide and penicillin therapy.

7. MELIOIDOSIS (STANTON'S DISEASE, PNEUMOENTERITIS, PSEUDO-CHOLERA). a. Agent. Malleomyces pseudomallei (Whitmore's bacillus; Pfeifferella, Loefflerella, or Actinobacillus pseudomallei). Cases have been recognized chiefly or only in Southeastern Asia, in territory now controlled by Japan.

b. Routes of infection. As in glanders. Transmitted by rat fleas (X. Cheopis) and possibly by other vectors.

c. Incubation period. Unknown. For guinea pigs, less than 24 hours, to 3 to 4 days, depending on dose and route of inoculation.

d. Onset. Variable, rapid to insidious.

e. Duration and prognosis. Of 95 cases recorded to 1933, 90 were fatal; death in from 62 hours to 3 to 4 weeks or more. Chronic cases, lasting several months to a year or more (least common) have best chance of recovery.

f. Symptoms. Extremely variable, not distinctive. In fulminating cases, vomiting, diarrhea, stupor, collapse, death within 1 week. In less severe cases, high fever, acute or chronic pneumonia, nodular or pustular rash or deeper tuberculoid lesions of skin or any organ.

g. Clinical diagnosis. Difficult because of wide variations; may resemble cholera, plague, severe typhoid, malaria, lobar pneumonia, or miliary tuberculosis; in subacute or chronic cases, resembles glanders, tertiary syphilis, pyemic infections of lung, liver, kidney. Pulmonary localization common.

h. Laboratory diagnosis. Depends almost entirely on demonstration of organism in sputum, lesion exudate, blood, urine, or viscera. Highly virulent for animals, especially guinea pigs, by any route. Gives positive Straus test in guinea pigs (intraperitoneal inoculation). Aerobic, gram-negative, polymorphic bacillus, no spores; grows profusely at 37°C. on ordinary media, best on 5 per cent glycerin agar, pH 6.5-7; most typical in 48 hours. Colonies mucoid, wrinkled. Distinctive features: motile, liquifies gelatin, digests egg-white, coagulates milk in 4 days. Agglutinins to M. pseudomallei or M. mallei develop in patients who survive 2 to 3 weeks or more.

i. Treatment. Entirely symptomatic. No specific therapy known. No data available on sulfonamides or penicillin.

8. PLAGUE. a. Agent. Pasteurella pestis.

b. Routes of infection. Plague is primarily a disease of rodents which is transmitted to man by certain fleas, by handling infected animals, and by discharges of buboes or by droplet inhalation from human cases. Pasteurella pestis in the air can cause plague in man directly, through inhalation or through wounds, or indirectly through infection of rats and their fleas.

c. Incubation period. Usually 3 to 7 days.

d. Clinical picture. Plague is traditionally described as occurring in three clinical forms, which, however, are not necessarily distinct. In all cases the course is usually rapid and severe, with high fever and prostration. Pustules, purpura, hemorrhages, and splenic and hepatic enlargements are common. Leukocytosis appears in most cases.

(1) The bubonic form is characterized by painful enlargement of the lymph nodes draining the portal of entry. Fatality rate is 30 to 75 per cent.
(2) The pneumonic form may arise directly by inhalation or may occur as the result of hematogenous spread. The sputum is thin, mucoid, and bloody. This form is usually fatal.
(3) The septicemic form is a rapidly generalized disease which quickly overwhelms the patient. There may be generalized lymphadenopathy, purpura, and pustules. Death usually ensues.

e. Diagnosis. Diagnosis rests upon the demonstration of Pasteurella pestis. Gland juice, blood, and sputum should be examined by smear, culture, and guinea pig inoculation. In bubonic plague, the organism frequently may be demonstrated by staining material aspirated from an involved node. Blood smears in cases of septicemic plague and sputum in cases of pneumonic plague may be loaded with organisms. Blood cultures may be positive even in mild cases of the bubonic form.

f. Treatment. Sulfadiazine should be given at the earliest possible moment and pushed to secure blood level of 15 to 20 mg. per 100 c.c. The initial dose is 4 grams, and subsequent doses 1.5 to 2 grams every 4 hours for at least 10 days. In fulminating cases and when treatment is delayed, sodium sulfadiazine 0.1 gram per kilogram body weight as 5 per cent solution in sterile distilled water should be given intravenously. Serum has been claimed to have saved some lives in bubonic cases both alone and in combination with a sulfonamide.

9. PSITTACOSIS (ORNITHOSIS, PARROT FEVER). a. Agent. A specific filterable virus.

b. Routes of infection. Man is susceptible by the respiratory route.

c. Incubation period. 11 to 14 days in most cases; may be longer.

d. Onset and symptoms. There is an acute onset with chills, headaches, and lassitude. Temperature rises rapidly; vomiting and delirium are common. Pulmonary involvement is usual. Cases of man-to-man transmission warrant installation of isolation technique in handling infected cases.

e. Duration and prognosis. The acute disease may last 1 to several weeks. The average mortality is approximately 25 per cent in cases diagnosed, but may be higher in individuals exposed to the rigors of outdoors.

f. Clinical diagnosis. Clinical diagnosis is made on the basis of physical and roentgenological findings. The absence of evidence for bacterial pneumonias and disproportionately greater X-ray than physical findings suggest a psittacotic infection. Psittacosis is one cause of severe primary atypical pneumonia.

g. Laboratory diagnosis. Intraperitoneal injection into mice of patient's sputum produces a serofibrinous exudate in the peritoneal cavity in 2 to 3 days. Even if symptoms are absent, the mice may be sacrificed, and splenic and peritoneal smears will reveal the presence of typical elementary bodies stained with Giemsa. Virulent strains kill mice in 72 hours. Isolation of virus is easily accomplished in all types of tissue culture and in embryonated eggs. By the sixth day of the disease, a positive complement fixation may be obtained with

antigen from mouse brain or mouse spleen or from cultures. A rising complement fixation titre is important.

h. Treatment. No specific therapy is available.

10. RIFT VALLEY FEVER (HEPATITIS ENZOOTICA); a. Agent. Specific filterable virus.

b. Routes of infection. Man is very susceptible by all routes.

c. Incubation period. 5 to 6 days following exposure to minute amounts of the agent.

d. Onset. Acute onset of influenza-like syndrome.

e. Symptoms. Wide variety of clinical manifestations. Conspicuously present are weakness, muscle and joint pains, headache, liver fullness and liver pain, eyeball tenderness. Central nervous system involvement is suggested by the frequency of mental confusion and vertigo. Convulsions may occur. Fever ranges from 100°F. to 103°F. Mortality is low; morbidity is unusually high as evidenced by incidence among personnel handling the agent. So far as is known, every person who has had contact with infected material has contracted the disease.

f. Duration. The acute phase may be only 7 to 10 days, but convalescence may be protracted (4 weeks or more).

g. Clinical diagnosis. Clinical diagnosis is difficult because of protean manifestations. History of exposure is important.

h. Laboratory diagnosis. After onset of symptoms, patient's blood is infectious. The test animal of choice is the mouse. Inject 0.1 c.c. or more (up to 0.5 c.c.) of citrated or defibrinated blood intraperitoneally into mice. Mice are susceptible by all routes, and the patient's blood is infectious for mice in high dilutions (1:1,000,000 intraperitoneally and subcutaneously, and 1:1,000 intranasally and intravenously). The fulminating disease in mice is manifested in 36 to 72 hours. Focal liver necrosis is the outstanding feature. Mice do not survive once symptoms set in. Filtration is easily accomplished since the virus is small. If known convalescent serum is available, simple neutralization tests with infected material (human serum or centrifuged mouse liver emulsion) will demonstrate specific nature of agent. Complement fixation test is possible with formolized liver antigens.

i. Treatment. No specific chemotherapy is known, but the intramuscular injection of convalescent (immune) serum is strongly recommended when possible.

11. TULAREMIA (DEERFLY FEVER, RABBIT FEVER). a. Agent. Bacterium tularense (Pasteurella tularense).

b. Routes of infection. Infection is possible by all routes. Common vectors are the tick and deerfly. By the inhalation route of infection, the disease is more fulminating, has a higher mortality rate, and a higher incidence of pneumonia. Man-to-man transmission, which practically never occurs in a civilian practice, may become a problem under field conditions.

c. Incubation period. Ordinarily 3 to 5 days. With massive dose, symptoms may appear earlier.

d. Onset. Generally sudden; may be gradual in mild cases. The outstanding features are fever, prostration and adenopathy.

e. Clinical diagnosis. Tularemia is easily recognizable clinically when there is inflammation at the point of entry through the skin or conjunctiva and where there is enlargement of regional lymph glands. But when the infective agent makes an entrance into the body by inhalation, the picture is that of extremely severe infection, with delirium and frequently death within a week or 10 days. Pneumonia is not an uncommon feature.

f. Laboratory diagnosis. In the typhoidal form, the diagnosis is made by the appearance of agglutinins, by isolation of the organism from the lung or blood stream and, in fatal cases, by specific pathologic findings. Bacteriologic work with the organism is extremely dangerous.

g. Treatment. No specific treatment is available.

12. TYPHUS FEVER. a. Agent. Rickettsia prowazeki.

b. Routes of infection. Commonly transmitted by lice in the epidemic form and by rat fleas in the endemic form. The usual immunizing procedures do not prevent clinical typhus after respiratory exposure, but the severity of the attack is commonly modified. The blood of patients is highly infectious.

c. Incubation period. From 6 to 15 days.

d. Onset and symptoms. The onset is acute, but may follow a short prodromal period. Headache is prominent. Vomiting accompanied by marked constitutional symptoms and prostration make up the general picture. Mental disturbances are frequently seen and usually reach a peak about the tenth day. Incontinence is common. A petechial or pink macular eruption appears on the fourth to seventh day. In the absence of a contact history differential diagnosis may be difficult unless one is familiar with the rash. Lesions in the palms, if present, speak strongly for typhus. Fever ranges about 104°F., while the pulse is relatively slow, usually of the order of 100. Leucopenia is usually present on the early days of the disease, gradually becoming less marked.

e. Duration and prognosis. Duration in uncomplicated cases is about 14 days with marked improvement occurring rather suddenly about the twelfth day. Convalescence is much prolonged. Death occurs in 10 to 60 per cent in different epidemics. Many complications may occur in recovered cases.

f. Diagnosis. Diagnosis is based upon the presence of other cases in a lousy population, the clinical picture and positive Weil-Felix reaction (B. proteus OX 19). A specific complement fixation test is available. Rickettsiae may be isolated by early injection of whole blood into guinea pigs by the intraperitoneal route. Six to 8 c.c. of blood should be injected, and fever and scrotal swelling in the guinea pigs should be expected. These known immune guinea pigs should receive the initial injection of whole blood. Some of the pigs should be examined for rickettsiae (tunica vaginalis and exudate on spleen). Laboratory work with the organism is dangerous for nonimmune personnel.

g. Treatment. No specific therapy is available. Good medical and nursing care are important.

By order of the Secretary of War:

G. C. MARSHALL,
Chief of Staff.

Official:
J. A. ULIO,
Major General.
The Adjutant General.

Distribution:
Med Off (1).

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CIRCULAR LETTER NO. 211-44

Pers-319-HBS
P16-3/00
24 Jul 1944

To: Commandants of All Naval Districts except 10, 14, 15, and 17.
Medical Officers in Command of All Naval Hospitals in the U. S.

(Copy to: All Ships and Stations Via NAVY DEPARTMENT BULLETIN)

Subj: Utilizing Services of Officers Fit for Duty Awaiting Discharge From Treatment at Naval Hospitals.

1. The Bureau of Naval Personnel Circular Letter No. 133-44 is hereby amended by adding the following paragraph:

"4. When a report of a board of medical survey is submitted on an officer in a naval hospital finding him fit for duty, and such officer is still attached to a local station, he will be discharged from the sick list when the survey has been signed by the medical officer in command and directed to resume his regular duties."

--BuPers. L. E. Denfeld

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To: MedOfCom, NavHosps and ConvalHosps (Continental)

BUMED-R1-OIM
P3-5/KK(073)
MARCORPS
18 Jul 1944

Subj: Instructions for processing Reports of Medical Survey in the case of officers of the U. S. Marine Corps and U. S. Marine Corps Reserve found to be fit for duty by Boards of Medical Survey.

Ref: (a) Paragraph 3423(i), Manual of the Medical Department, U. S. Navy.

1. Reference (a) provides that no patient who has been surveyed will be disposed of until the activity submitting the report has been informed, by receipt of the returned copy, or otherwise officially notified, of the action taken by the Navy Department on the report. Although in the past it has required from two to four weeks to effect the return to duty of officers found to be fit for duty by Boards of Medical Survey, experience has shown that an average time of less than 48 hours is required to process reports of Medical Survey in the Bureau of Medicine and Surgery. In the interest of more efficient utilization of both personnel and hospital facilities, it is desired that officers be returned to a duty status as expeditiously as possible following hospitalization. In order to effect this, it is directed that the following procedure be carried out:

(a) When an officer of the U. S. Marine Corps or U. S. Marine Corps Reserve is found by a Board of Medical Survey to be fit for all his duties or for limited duty, the Board's report shall be processed at the submitting activity and forwarded to the Bureau of Medicine and Surgery (by Air Mail whenever feasible) as expeditiously as practicable. If the duties of such an officer involve flying, the Report of Medical Survey shall be accompanied by a Report of Physical Examination for Flying (NavMed-AV-Form 1).

(b) Especial care shall be given the preparation of such reports in order that sufficient information regarding the nature of the disability, the origin and conduct status, aggravation by service and the present condition of the patient be presented to permit action to be taken without further reference of the report to the Board of Medical Survey for amplification or clarification in some of the above respects.

(c) Upon receipt of orders or a copy thereof from the Commandant of the Marine Corps, in which it is stated that the Report of Medical Survey has been approved, appropriate entries shall be made in the health record regarding departmental action on the Report of Medical Survey, and the officer concerned shall, upon discharge from treatment, be directed to carry out his orders even though the approved copy of the Report of Medical Survey has not been received by the activity from which it originated.

2. It is believed that orders can be issued by the Commandant of the Marine Corps in the cases of such officers and delivered to the activity from which the Reports of Medical Survey originated within a period of seven to ten days from the date of submission of Reports of Medical Survey if such Reports are submitted by air mail and orders are returned by dispatch or air mail.

3. Occasionally officers of the U. S. Marine Corps or U. S. Marine Corps Reserve are admitted to a Naval Hospital within the same Naval District as their permanent station off duty and are not detached from their permanent station of duty. Such officers who appear before a Board of Medical Survey and are found to be fit for all their duties may be returned to their permanent station of duty upon approval of the Report of Medical Survey by the Medical Officer in Command of the Naval Hospital. In such cases the endorsement on the Report of Medical Survey should indicate that the Report has been approved by the Medical Officer in Command and that the officer has been returned to duty in accordance with this joint letter. If the duties of such an officer involve flying, the Report of Medical Survey should be accompanied by a Report of Physical Examination for Flying (NavMed-AV-Form 1).

--MarCorps. A. A. Vandergrift. --BuMed. L. Sheldon, Jr.

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To: All Ships and Stations SONRD:HGD:emjl

Subj: Army-Navy-OSRD Vision Committee 22 Jul 1944

1. Many special problems involving vision arise in connection with night operations, binoculars and gun sights, sun goggles, color coding, instrument-panel design, and other equipment. In order to provide better coordination of technical information from all sources, there has been established a joint Army-Navy-OSRD Vision Committee, with members from each of the appropriate arms and services of the War Department and bureaus and offices of the Navy Department, together with leading scientists in this field representing the Office of Scientific Research and Development. The committee holds frequent meetings for discussion of practical problems arising in operations, and maintains an extensive collection of information and reports on all phases of vision.

2. All bureaus and commands encountering problems in the field of vision are requested to furnish information, and invited to submit inquiries, to the committee. Communications may be sent to the Executive Secretary, Dr. Donald Marquis, 2101 Constitution Avenue, Washington 25, D. C.

--SecNav. Lybrand Smith.

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To: All Ships and Stations P11-1/A16-3(103-42)

Subj: Management and Transport of Chemical Warfare Casualties in Naval and Marine Forces. 19 Jul 1944

Refs: (a) BuMed ltr. F34-5(052-37), P-4KC, of 21 May 1943; N. D. Bul. Cum. Ed. 1943, 43-1094, p. 473.
(b) BuMed ltr. A11/16-3(093), of 6 Jan 1944; N. D. Bul. of 31 Jan 1944, 44-97.

1. GENERAL.

A. Casualties unable to apply self-aid are cared for by the medical services. A casualty is defined as one who is no longer able to carry out his military duties as a result of injury.

B. Noncasualties who are contaminated are charged with the responsibility of self-aid at the earliest possible moment consistent with battle conditions.

C. The management and transport of contaminated gas casualties whether wounded or otherwise will be governed primarily by military considerations.

D. To facilitate the management and transport of gas casualties, the medical officer whether afloat or ashore shall develop a practicable and safe plan applicable to the command to which he is attached. This plan shall be incorporated in the gas defense bill of that unit.

E. Certain improvisations may be necessary to activate such a plan. The basic principles of management and transport must be clearly understood and applied in order to make it effective.

F. The most difficult problems of management and transport concern casualties contaminated with blister gas.

2. PRINCIPLES OF MANAGEMENT AND TRANSPORT.

A. Avoid spread of contamination.

1. If gas warfare agents have been used, it must be assumed that all casualties are contaminated until proved otherwise.

2. Personnel shall take all reasonable precautions to protect themselves adequately while handling contaminated casualties. If blister gas is encountered they must wear the mask, protective ointment, protective suits, protective gloves, rubber overshoes, and an impervious apron. In an emergency the individual protective cover issued to advanced-base personnel may be used instead of the impervious apron. These items except the mask and protective cover are contained in the gas casualty treatment case, unit No. 10, Med. Supply Item 14-055.

3. Personnel handling contaminated casualties shall avoid spreading contamination to other personnel and to facilities not specifically designated for the reception of gas casualties.

4. Contaminated personnel, casualties, clothing, and equipment must be prevented from gaining access to totally enclosed spaces either afloat or ashore. Interior contamination of the ship or of enclosed structures ashore must be avoided.

5. Contaminated clothing and equipment shall be placed in tightly covered containers marked for the purpose, or in designated dumps sufficiently far moved from the scene of activities, for decontamination or disposal as determined by the chemical warfare officer.

B. First Aid.

1. The problem will arise frequently as to which condition requires priority of first aid, the surgical condition or the gas hazard.

2. In all instances such as severe hemorrhage or shock, the surgical condition takes priority of action.

3. If the surgical condition permits delay, the casualty shall be decontaminated on the spot, protected from further exposure and, if consistent with battle conditions, transported to the nearest aid station designated to receive gas casualties.

3. TRANSPORT OF GAS CASUALTIES.

A. Stretcher bearers adequately trained and equipped to handle gas-contaminated casualties should be detailed to transport such cases.

B. The gas hazards attending the management and transport of contaminated casualties in operations ashore may be enhanced by the distances involved and by the character of the terrain, foliage, and weather. Afloat, the hazards tend to be increased by the limited topside space available for decontamination, the provisions for gas integrity of the ship, and the small openings and passageways which limit transport to dressing stations.

C. Ashore, the hazards of transporting gas-contaminated casualties by stretcher shall be minimized by using two stretcher covers, if available, as follows:

1. Stretcher Cover No. 1.

(a) This cover shall be the impervious cover issued to advanced-base naval personnel and the Marine Corps. Medical officers of advanced bases shall arrange to draw the necessary supply of this item from the stock to be maintained by the Bureau of Ships in these areas. If not available from this source it may be obtained from the casualty encountered or other personnel as in the case of the Marine Corps. Medical officers attached to Marine Corps units shall utilize the impervious protective cover carried in the gas-mask carrier of the casualty transported or from other personnel, as the Marine Corps does not maintain a reserve stock for use as stretcher covers. In an emergency, the poncho carried by Marine Corps personnel in combat areas may be utilized.

(b) For use on the stretcher the cover will be split up each side or up one side and across the top.

(c) The use of a clean impervious cover with each casualty permits the alternate transport of a wounded but clean casualty, by the same stretcher, since it prevents contamination from the stretcher to the casualty and vice versa.

2. Stretcher Cover No. 2.

(a) This cover is an ordinary unimpregnated blanket routinely issued to stretcher bearers.

3. If two stretcher covers, No. 1 and No. 2, are used, the following procedure should be carried out:

(a) Stretcher Cover No. 2 is laid over No. 1 and both are folded over so as to bring the side edges to the center. They are to be folded again and the ends turned in to fit the stretcher, when in the carrying position.

(b) The prepared stretcher is placed beside the casualty; first aid is administered; the covers are unfolded; the casualty is laid on No. 2 cover; the sides are folded over the casualty and transport begun.

4. Transport by ambulance or other enclosed vehicle of the contaminated gas casualty cannot be undertaken except with grave risk of contaminating its interior. Casualties must be decontaminated before such transport.

5. Upon depositing the casualty at the aid station the stretcher covers are to remain with the casualty. Clean covers, if available, previously folded, are to be laid into the stretcher for the transport of another casualty.

D. Afloat, the problems of transport do not warrant the use of the impervious protective cover. This item is not issued to naval vessels. It is advised that an ordinary blanket be substituted, even though it is pervious to vesicant liquid or vapor. This is preferred to leaving the casualty completely exposed. The blanket must be subsequently handled as a contaminated item.

E. For all activities it must be emphasized that if the stretcher is not equipped to limit undue hazards, it becomes contaminated and must be handled as such.

4. AID STATIONS FOR GAS CONTAMINATED CASUALTIES.

A. Aid stations shall be improvised with free ventilation, up-wind from the gassed area and protected as much as possible against drops of liquid gas from overhead structures or foliage. In no event shall it be an enclosed space.

B. The station shall be located in a gas-free area, if possible. If a contaminated area must be selected, proper decontamination shall be carried out.

Afloat, this is accomplished by using the noncorrosive decontaminating agent RH-195 issued by the Bureau of Ships. Ashore, chloride of lime, also known as bleach, is satisfactory. Bleach may be spread over the area either as a powder or mixed with water.

C. The aid station shall be clearly posted for easy identification and shall be marked off into an unclean and a clean area, the latter being on the windward side.

1. The Unclean Area.

(a) The unclean area should be equipped with tightly covered G. I. cans or similar recepticles for reception of contaminated clothing and equipment, a reserve stock of protective ointment S-461 or S-330 and BAL Ointment, an adequate supply of water and soap for cleansing, standard first-aid equipment for the care of wounded casualties, and a foot box containing RH-195 powder or bleach powder through which all personnel must walk in going from the unclean to the clean area in order to decontaminate foot gear. It is advisable also to improvise stands (saw-horse or the like) for supporting the stretcher and casualty above the terrain or deck.

(b) The contaminated casualty deposited in the unclean area shall receive first aid. All contaminated clothing, equipment, covers, blankets, and valuables, except the gas mask, if worn, shall be placed in specified G. I. cans for disposal by the chemical-warfare officer. The casualty is to be further cleansed by the removal of all gross liquid agents and by the application of antigas ointment or in accordance with references (a) and (b) and other decontaminating procedures as outlined in Manual NavMed, 220, "The Treatment of Casualties From Chemical Warfare Agents." The casualty is then ready for transfer to the clean area in a clean stretcher and/or clean covers and blankets.

2. The Clean Area,

(a) The clean area shall be reserved for decontaminated casualties. Before entering this area, the gas mask shall be removed if the atmosphere is gas-free. Additional first-aid measures may then be carried out, after which the casualty is ready for transport to a battle dressing station or to a shore medical facility for further specific treatment.

--BuMed. L. Sheldon, Jr.

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To: All Ships and Stations

BUMED-Y-DEC
A16-3/JH1
20 Jun 1944

Subj: The Detection of Chemical Warfare Agents in Water.

1. This Bureau has adopted a kit for use in the detection of chemical warfare agents in water designated as "Kit, Water Testing, and Screening, for The Detection of Chemical Warfare Agents"; stock number S13-461.

2. Upon requisition these kits are available, from medical supply depots, to the following activities:

(a) Forces afloat. - All seagoing naval vessels to which Medical Department personnel are assigned.

(b) Forces ashore. - (1) All land-based activities in foreign areas to which Medical Department personnel are attached (either medical officers or hospital corpsmen on independent duty).

(2) Each group of naval activities in one area, such as the Norfolk area, and all other naval activities on the Atlantic coast, Gulf coast, Pacific coast and Great Lakes areas to which Medical Department personnel are attached. The District medical officer shall designate the activity to accept this responsibility.

3. Each of these kits includes a printed booklet of directions for use.

4. The booklet does not contain general data relative to the toxic limits of gases in water, the reaction of gases with water, and the limitations of tests performed with the kit. This letter supplies the necessary data on the above factors and specific instructions for the use of the subject kit. The data presented are based on source material from the Chemical Warfare Service, War Department, and the National Defense Research Committee, Division 9, Report OSRD No. 1732.

5. General. - Contamination of water supplies with chemical agents has been encountered rarely, but in those instances the percentage of casualties was high.

(a) Methods for detecting chemical agents make it possible to determine safe and unsafe water. The testing of such contaminated water and report of its potability is the responsibility of the medical officer. The actual decontamination of water contaminated by chemical warfare agents is under the cognizance of the group responsible for the procurement and treatment of water supplies. Decontamination of such water should be resorted to only in extreme emergencies.

(b) Important agents. - The vesicants and the systemic poisons, cyanogen chloride and hydrogen cyanide, are the agents most likely to cause casualties when introduced into water. It is considered improbable that toxic concentrations of heavy metals and alkaloids will be encountered.

6. Toxic limits. - The toxic limit for lewisite is 20 ppm. (20 mg./l) (10 ppm. (10 mg./l) as As_2O_3), provided the water is chlorinated by the standard procedure for bacterial purification and is used for not more than 1 week. Nitrogen mustards in concentrations of 10 ppm. (10 mg./l) have produced vomiting in man but have not caused actual casualties. In higher concentrations they are extremely toxic. Mustard dissolves slowly in water but may be found floating in tiny globules, as a film on the surface or collected in pools on the bottom. Small droplets when fed with water to rats have produced perforating ulcers in the intestinal tract. The limits for cyanogen chloride and cyanide are 10 ppm. (10 mg./l).

7. Reactions with water. - The three vesicants - lewisite, mustard, and nitrogen mustards - all react with water to form hydrochloric acid and the hydrolysis product corresponding to the agent. Lewisite reacts with water practically instantaneously, forming the hydrolysis product "lewisite oxide," which is toxic and somewhat vesicant. Mustard reacts with water to form the nontoxic thiodiglycol. A solution containing 100 ppm. (100 mg./l) mustard becomes nontoxic at the end of 1 hour. Some types of mustard contain a highly odorous compound which renders the water nonpalatable even after hydrolysis. Nitrogen mustards hydrolyze slowly to a nontoxic product. A solution containing 100 ppm. may remain toxic for 4 to 6 days. Cyanogen chloride, cyanide, and heavy metal salts dissolve in water but do not react extensively with it.

8. Description of water testing kit. - For the sake of simplicity, analytical procedures have been developed to employ dry reagents which are furnished as tablets or pellets of proper size. Except for warming with the hand in some of the tests, no heat is required. The kit contains equipment for testing 15 samples of water. The reagents and equipment are packed in a pocket-sized container, approximately 5-1/2" x 3-3/4" x 1-3/4", divided into 10 compartments. The container is constructed of transparent plastic. The kit contains 2 test tubes, a chlorine demand assembly, a bottle and tube for the detection of arsenicals by a modified Gutzeit's method, and 7 vials containing reagents and test papers. The vials are identified by letters printed on the paper liners. Their caps are made of colored plastic matching the color of the paper liners. A test-tube brush and pipe cleaner are provided for cleaning the apparatus.

9. Application of water-testing kit. - The primary purpose of the kit is to detect contamination by chemical warfare agents in the raw water. The limits of the sensitivity of the tests are on the safe side.

(a) If none of the tests indicates amounts of chemical agents in the raw water beyond the specified toxic limits, the water can be used after usual treatment at water points or in Lyster bags without any specific decontamination procedure for chemical agents for a period of 1 week.

(b) If any of the tests included in this kit are positive, the water should not be used until a more complete analysis can be made. Larger and more complete water-testing equipment containing apparatus and chemicals for the quantitative determination of contaminants is necessary. Such quantitative tests are under the cognizance of the group responsible for the procurement and treatment of water.

10. Sensitivity and limitations of the tests. - If the tests are carefully performed, the threat of serious casualties from contamination of the water with known agents will be avoided.

(a) The arsenic test will show whether any arsenic is present or not. The lengths of stain produced by 5, 10, and 15 ppm. of arsenic in the form of organic arsenicals are sufficiently different so that one can tell approximately how much arsenic is present. Inorganic arsenite or arsenate produces very long, dark stains at the above concentrations.

(b) The pH test is a general screening test. Any water with a pH below 6.5 or above 8.5 should be suspected of contamination.

(c) The test for mustards will detect mustard or the nitrogen mustards in 5 ppm. Thiodiglycol will not react. Ethyl iodoacetate and chloroacetophenone will also react, but these can be detected readily by their odor so it is thought they will cause no difficulty. Cyanogen chloride yields a yellow color with the RA tablets alone and can be detected as low as 10 ppm. No blue color develops when the RB tablet is added.

(d) The o-tolidine reaction used to detect chlorine residuals in the chlorine demand test is sensitive to 0.1 ppm. of chlorine. A chlorine residual does not mean a safe water. It has been shown that water contaminated with mustard or thiodiglycol may show a chlorine residual and actually still have a chlorine demand. An excess of 4 to 5 ppm. of chlorine above what is needed for the actual chlorine demand is necessary in order to have complete reaction between the chlorinating agent and the mustard or thiodiglycol. If this condition is not met, the water will show a chlorine residual as determined by the o-tolidine reaction when it still has a chlorine demand. Other colors may be obtained when using the o-tolidine reaction. If the color is blue or green, it means there is too much o-tolidine for the amount of chlorine present. A red or orange color means that too great an amount of chlorine has been added.

11. Interpretations, limitations of tests. - Negative results from all of the tests indicate that the water is safe for use after chlorination insofar as chemical warfare agents are concerned. A positive result for any one of the tests is presumptive evidence that the water is contaminated with a chemical warfare agent.

Water showing a positive result for any one of the tests shall not be used without special treatment to remove the chemical warfare agent except in cases where it can be clearly demonstrated that one or more of the limitations specified below is applicable.

(a) The test for arsenic allows some latitude in the interpretation of the results. If the stain on the test is not longer than 1/4 inch, the arsenic content is not more than 10 ppm. as organic arsenic. Water with this concentration of organic arsenic may be used for a period not to exceed 1 week because of possible cumulative effects, provided all the other tests are negative and the water is thoroughly chlorinated. If the stain is longer than 1/4 inch the water shall not be used.

(b) A pH below 6.5 should be regarded with suspicion unless the character of the water source seems to indicate a naturally low pH. Contamination of the water by mustard, the nitrogen mustards, or arsenicals would lower the pH as all these chemical agents release hydrochloric acid in water solution. A pH above 8.5 probably means contamination with some basic material as potassium cyanide.

(c) If the test for mustard and the nitrogen mustards is positive, the water should be rejected for all purposes. Water may pass the test for nitrogen mustards and still give symptoms if consumed in large quantities. Hence, the water should not be used without special purification if even the faintest blue color develops. When the result of the test is questionable, the amount of water permitted per man, at the first drinking, should be limited to 1/2 pint; if no symptoms of nausea or vomiting develop during the succeeding 2 hours, the water may be used freely thereafter.

(d) A high chlorine demand means contamination with mustard, thiodiglycol, arsenicals, or pollution by organic waste material. If the arsenic test is negative, the chlorine demand is a measure of contamination by mustard. However the water may also be contaminated with the nitrogen mustards which do not react in the chlorine demand test.

12. Action required if the water is found to be contaminated by chemical agents. Contamination discovered in otherwise suitable water should be reported promptly to the commanding officer, so that the matter can be brought to the attention of the officer responsible for decontamination.

(a) The commanding officer will establish the necessary safeguards to prevent men from drinking the contaminated water.

(b) An alternative source of uncontaminated water should be sought, and if found should be employed.

(c) If a source of uncontaminated water cannot be found, consideration should be given to moving to a different location, or to importing purified water.

(d) In any event, the contaminated water should not be used by men until it is decontaminated.

13. Directions for the use of the kit. - The field kit for water testing is designed as a reconnaissance kit. Its purpose is to screen out sources of water so contaminated with chemical agents that they cannot be rendered potable by customary field treatment methods, such as chlorination in the Lyster bag. Individuals performing the tests must have normal color vision.

(a) Negative tests indicate water suitable for chlorination and may thereafter be used by troops.

(b) If any of the tests are positive, the water should not be used until a more complete analysis can be made.

(c) The main purpose of the kit is to detect contamination by chemical agents in raw water. It is not designed for use in the testing of treated water. Chemical reactions during water treatment invalidate the interpretations.

14. Procedures for tests.

(a) General directions.

(1) Read directions thoroughly.

(2) Obtain water sample in canteen cup without excessive disturbance of water source.

(3) Start arsenic test (par. (b) (1) below). While arsenic test is developing, carry out the other tests.

(b) Arsenic test:

(a) Pour suspected water into the bottle (P) to mark on bottle.

(b) Place 2 tablets from vial A into the bottle. Shake to dissolve.

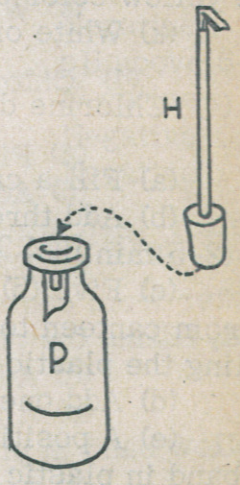
(c) Take a test strip from vial B by the top end. Carefully insert into the tube (H) bending the strip near the top so that it will remain on the upright tube. Touch only the top end of the strip. Keep dry.

(d) When the tablets (A) have disintegrated, add 5 tablets from vial C to the contents of the bottle (P).

(e) Promptly fit the test paper assembly into the bottle.

(f) If cold, warm the bottle in your hands. Let react for 20 minutes.

(g) Remove the strip and note the length of the yellow to brown stain. A stain 1/4 inch or more indicates a positive test. A stain less than 1/4 inch indicates a negative test.



Gutzeit's Apparatus

(2) pH test.

(a) Dip a strip of the nitrazine paper into the water until it becomes thoroughly wet. Remove and compare resulting color with color chart on case lid. pH less than six (6) indicates possible contamination.

(3) Mustard test (including nitrogen mustard and cyanogen chloride).

(a) Rinse test tube with suspected water.
(b) Carefully fill test tube to 1/2-inch depth with suspected water.
(c) Add one tablet from vial D.
(d) Shake for 3 minutes, to break up the tablet. Allow to stand for 5 minutes.
(e) During cold weather, warm tube in hand or inside pocket for additional 5 minutes.

NOTE: Yellow color after (d) or (e) is positive test for cyanogen chloride.

(f) Break one tablet from vial E in half and add both halves to water being tested.
(g) Shake until broken up. While shaking, watch for the development of any color.
(h) Observe for 1/2 minute against white background.
(i) Even a slight blue or red color (mainly in curd) indicates a positive test for mustard or nitrogen mustard.
(j) A yellow color indicates cyanogen chloride. In heavy contamination the yellow color appears before (3), (f).
(k) White or light gray color indicates a negative test for mustards.

(4) Chlorine demand test.

(a) Fill a canteen with water to within an inch of the top.
(b) Add three (3) tablets from vial F, screw cap on and shake to dissolve. (2-5 min.)
(c) Five (5) minutes after tablets have dissolved transfer treated water from canteen to plastic tube to bottom of yellow band of vial X testing set, filling the plastic tube to bottom of yellow band.
(d) Add one tablet from vial X, shake and note color when dissolved.
(e) A positive test is indicated by no color or color lighter than yellow band in plastic tube.
(f) A negative test is indicated by an orange color or color as deep as the yellow band.

(5) Taste and odor.

(a) If test b, (1), arsenic; b, (3), mustard; b, (4), chlorine demand, are negative, and pH is 6 or above, carefully smell and taste a small sample of the suspected water.

(b) A positive test is indicated by:

(1) A lacrimating or chlorinous odor.
(2) A biting and/or peppery chlorinous taste.
(3) Any taste or odor of a known war gas.

(c) Absence of all tastes or odors will indicate a negative result but not necessarily a safe water. A negative test is also indicated by the presence of only those odors and/or tastes normally characteristic of natural waters.

15. Interpretations

Test		Contaminated Water (Water will be considered contaminated if one or more of the tests gives results as indicated in this column)	Non-contaminated Water (Water will be considered suitable, after bacterial disinfection by usual methods, for 1 week if all the tests give results indicated in this column)
Arsenic test	b,(1)	Positive	Negative
pH test	b,(2)	pH below 6	pH above 6
Mustard test	b,(3)	Positive	Negative
Chlorine demand	b,(4)	Positive	Negative
Taste and odor	b,(5)	Positive	Negative

--BuMed. Ross T McIntire.

To: All Ships and Stations

BUMED-Y-ME
P2-3/P3-1(064)

Subj: Forwarding of Subcultures of All Enteric Pathogens.

5 Jul 1944

1. Dysentery and other diarrheal disorders are still responsible for a considerable part of the sick days lost by our naval personnel.

2. In order that the prevention and treatment of these conditions may be made more effective, it is imperative that information as to their frequency and specific etiology be obtained.

3. It is therefore directed that officers in charge of laboratories of naval hospitals, dispensaries, hospital ships, and epidemiology units, and of all other laboratories doing definitive bacteriology, shall forward via official channels to the Enteric Pathogen Laboratory, Naval Medical School, National Naval Medical Center, Bethesda, Maryland, U.S.A., subcultures of all strains of enteric pathogens isolated in their laboratories. These shall include all members of the Salmonella, Shigella, Pseudomonas, Proteus, and Paracolon groups. The cultures shall be forwarded on plain infusion or nutrient agar slants. In order to conform with Postal Regulations (title IV, par. 589, subpar. 3d, 1940) the tubes shall be stoppered with cork or rubber stoppers, or sealed with wax, and shall be mailed in double containers, one of which is of wood or metal. The tube shall be completely and evenly surrounded by absorbent cotton or other suitable absorbent packing material. A brief summary of pertinent clinical and epidemiologic information concerning the case from which the organism has been isolated shall be included whenever possible.

4. Upon completion of the identification and typing of the organism submitted, a report will be forwarded from the Enteric Pathogen Laboratory at the Naval Medical School to the ship or station from which the culture originated.

--BuMed. Ross T McIntire.